LIMA LOCOMOTIVE WORKS, INC.

LIMA, OHIO, U. S. A.

ENGINE SPECIFICATION

ORIGINAL

Order No.	For	Type	Shop Nos.	Date
1134	L. & A. Ry.	2-8-2=8	7641-7645	

FORM ED-103 200 2-30 LPLCo 26563

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Inspector's Copy returned 8/14/36

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HOLD. ~~[illegible]~~
~~DRAFT GEAR~~
~~STAYBOLT IRON. TH~~

PILOT TO BE STEEL Job 4/54
✓Report Cards
Stencils - Pete has written
✓Valve Setting etc

Send Wm. Nelson (K.C.S.)
copy of drawing room spec
per AJT instructions that
Mr. Dixon so advised

LLS
5/28/42

ICORPORATED
RTMENT

DUPLICATE ENGINES

DATE Sept. 10, 1936

-8-2 ORDER 1134

SPECIFICATION NO. 1134

cab to front end of oil line
burner.

The 2 inch feed line runs straight from tank connections on engine frame to the firing valve.

X 2. Automatic blow-off valves have been applied to left side of boiler.

3. Have applied extensions to both blow-off cocks

X 4. Have applied rail washers.

5. Exhaust tip has been made 5-3/4".

Reference: Letter dated September 6, 1936, file 1134.99, also marked prints in 1134 Engineering file.

RM ED-133 2M 12-23 FTP

- 2 Percy
1 Corres.File
1 Draw.Off.File
1 Draw.Off.Material Book
1 Bascombe

LIMA LOCOMOTIVE WORKS, INCORPORATED
ENGINEERING DEPARTMENT

CHANGES TO BE CONSIDERED IN BUILDING DUPLICATE ENGINES

EMORANDUM NO. 1 MADE BY C.F.R. DATE Sept. 10, 1936

ROAD LOUISIANA AND ARKANSAS CLASS 2-8-2 ORDER 1134

NOTES MADE ON ENGINES NOS. All ATTACH TO SPECIFICATION NO. 1134

NOTE—DO NOT REPORT MORE THAN ONE ORDER ON THIS SHEET

1. Firing valves have been changed from under the cab to front end of oil line with a 1-1/4" nipple 6" long between valve and burner.

   The 2 inch feed line runs straight from tank connections on engine frame to the firing valve.

2. Automatic blow-off valves have been applied to left side of boiler.
3. Have applied extensions to both blow-off cocks
4. Have applied rail washers.
5. Exhaust tip has been made 5-3/4".

Reference: Letter dated September 6, 1936, file 1134.99, also marked prints in 1134 Engineering file.

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SPECIFICATION

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ORDER 1134

Date 1936	Page	Item	AUTHORITY FOR CHANGE
6-11	8T	6* ✓	Advice of Mr. Percy
6-11	10	20* ✓	Interview dated 6-9-36
6-11	11T	12* ✓	" " "
6-11	21	14* ✓	" " "
6-11	18	21* ✓	" " "
6-11	29	21* ✓	" " "
6-11	[illegible]	[illegible]	Information from Engineering Dept.
6-11	9	14* ✓	" " " "
6-11	9	15* ✓	" " " "
6-11	10	4*	Mr. Snyder's letter 6-8-36
6-11	6T	6* ✓	" " "
6-19	22	9*	Advice of Mr. Percy.
6-19	33	16*	Memo from Mr. Woodard 6-17-36
6-19	6T	6**	Information from Eng. Dept.
7-1	28	12*	Advise of Mr. Percy
7-1	5	18*	" " " "
7-1	7T	18*	Letter from E. M. Smith 5/19/36 (H.W.S.)
7-7	35	2*	Mr. Percy's letter 7/6/36
7-7	35	21*	Information from Engineering Dept.
7-14	22	11*	Telegram from Mr. Smith 7-14-36 (H.W.S.)
7-16	1	4*	Information from Stencil received from R.R. Co.
7-16	22	13*	" " " " " " "
8-6	22	5* 15*	Memo. from Mr. Dixon 8/5/36 (H.W.S. file)
8-14	1T	17*	Engines as built
8-14	1T	14*	Tenders as built

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LIMA LOCOMOTIVE WORKS, INCORPORATED

Lima, Ohio, April 28, 1936

ENGINE SPECIFICATION

Order No. 1134 For Louisiana & Arkansas Railway Co.

Based on Spec. A-2720 General Design Shown by

No. of Engines 5 Type 2-8-2 Service Freight & Switching, see page 35, item 18

Shop Numbers 7641-7645 Road Numbers 561-565 R. R. Co's Class* See pg. 22

Made by AMS Checked by

Note- First two engines only to have Franklin Tender Booster, and two Loco. Firebox (Co.'s thermic syphons (in firebox.

Cylinders 23" dia., 32" stroke

Driving wheels 63" dia.

Boiler type , straight top, radial stayed. Working pressure 240 lbs. sq. inch.

Tubes, number 234 dia., 2" length 20'-0"

Flues, number 45 dia., 5-3/8" length 20'-0"

Firebox inside 120-1/8"x72" Grate area 60.1 sq. ft. Fuel oil

Heating sur. (in sq. ft.)	Tubes	Flues	~~Arch Tubes~~ & Syphons	Firebox ~~Comb. Chbr.~~	Total	Superhtr. Pipes
Engs. 7641-7642	2440	1261	75	212	3986	approx. 1016
Others	2440	1261	-	212	3913	" 1016

Weight, loaded	Eng. Truck	Any pair Drivers	Total Drivers	Trailing Truck	Total Eng.
Specified Engs. 7641-7642	34000		208000	50000	292000
Specified Others	32000		208000	48000	288000
*Engs. 7641-7642 Actual	40000		208500	52500	301000
→ Actual Others	38100		208100	52000	298200
Limitations					

Wheel base, Driving 16'-9" , Engine 36'-11" , Total E. & T. approx. 72'-6"

Engs. 7643-7645 → Tractive power without Booster 54800 lbs. at full stroke cut off. Factor of adhesion 3.8

Engs. 7641-7642 → Booster tractive power 16500 lbs. Total tractive power 71300 lbs.

Gauge of track 4'-8-1/2" curvature (max.) 18 degrees grade (max.) 1%

Tender, water capacity 9500 U.S. gals. Fuel capacity 4000 U.S. gal.

Limitations, height 15'-0" width 10'-3" length over all

General design- Sky line to be kept as low as possible.

Clearance diagram

Weight of rail 75 lbs.

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ENGINE SPECIFICATION

PAGE 2

1

ORDER 1134

Material Specifications and Inspection

All material entering into the construction of these locomotives is to conform to the specifications of the American Association of Railroads as used by Lima Loco. Works, Inc. in constructing domestic locomotives, except for the following -

Guides, Piston Rods, Main and Side Rods, Knuckle Pins, Crosshead Pins and Crank Pins to be made of medium carbon steel, selected forging quality. Billets to L.L.W. Spec. L-20-A and forgings to L-21-A.

The following list of A.A.R. specifications will apply -

Boiler & firebox steel (except nickel)	M-115-34
Seamless steel tubes & flues	M-108-34
Boiler rivet steel & boiler rivets	M-110-34
Wrought iron bars - refined	M-302-34
Miscellaneous bearings - hard bronze	M-503-34
Steel castings (except main driving wheel centers.)	M-201-34, grade B
Springs-carbon steel - elliptical	M-113-34
Springs-carbon steel - helical	M-114-34
Steel tires	M-106-34
Structural steel	M-116-34

Main Driving Wheel Centers - alloy cast steel having tensile strength of 85000 lbs, yield point 55000 lbs, elongation in 2", 22%; and reduction of area 40%.

The general construction of locomotive to be inspected by Robert W. Hunt Co., Pittsburgh, Pa. They will also inspect the following materials at point of manufacture

Boiler and firebox plate
Main frames
Driving Axles
Engine, Trailer and Tender Truck axles
Driving Wheel centers
Engine, trailer and Tender truck wheels.

Arrange to furnish the Hunt Co. with duplicate copies of purchase orders on the above materials, also send one copy to Mr. E. M. Smith, S.M.P., L& A R.R., these copies are not to show prices.

ENGINE SPECIFICATION

ORDER 1134

10 **~~Ash or~~ Oil Pan** of steel plate and provided with suitable dampers or air inlets.

Air or hand operated from -

Hoppers, number and material -

Slide of - guide of -

Drop plate of - frame of -

11 **Driving Axles** of medium carbon steel annealed.

Main journals 11" dia., 13" long, wheel fit dia., hollow bored - dia.

Other Journals 10" dia., 13" long, wheel fit dia., hollow bored - dia.

Axles from open market

Axle marking as required by I.C.C.

Engine Truck Axle of medium carbon steel, annealed.

Journals 6½" dia., 12" long, wheel fit dia., hollow bored - dia.

Axles from open market

Axle marking as required by I.C.C.

Trail. Truck Axle, ~~front~~ of medium carbon steel ~~rear of~~ annealed.

Journals, ~~front~~, 9" dia., 14" long, wheel fit dia., hollow bored - dia.

Journals, rear, - dia., - long, wheel fit - dia., hollow bored - dia.

Axle from, ~~front~~ open market ~~rear~~

Axle marking as required by I.C.C.

12 **Bell** of bell metal, located on smoke box front at top.

Bell ringer Viloco pneumatic.

ENGINE SPECIFICATION

ORDER 1134

13-14 **Boiler** Boiler to be built to ~~I. C. C.~~ or A. S. M. E. rules, section 3.

Boiler designed for 240 lbs. pressure; factor of safety 4.5

Hydrostatic test 300 lbs. Steam test 260 lbs.

Working pressure 240 lbs.

Boiler $82\frac{3}{4}$" O. D. at front, $85\frac{3}{4}$" O. D. at throat

Shell courses of nickel steel, remainder of sheets to be of homogeneous carbon steel, flange quality. All plates to be from Worth Steel Company.

Seams horizontal, multiple riveted butt joint and double strap construction.

Boiler seams caulked outside only. All holes reamed perfectly true before sheets are put together. No hand riveting permitted except where it is impossible to use power riveter.

Seams circumferential double riveted lap.

Rivets of steel

Pressure plate of brass

Thickness of sheets, smoke box 5/8" and liner 1/2"

front tube 5/8", 1st course 23/32", 2nd 3/4", 3rd 3/4"

Throat 7/8, roof and, sides 5/8", backhead 9/16"

Back sloping yes; throat sloping yes; roof and sides in one piece.

Tube sheet ring of cast steel

Bracing of iron, engine bolt quality.

Dome 32" I. D., one piece type high. / Material firebox quality steel plate

Shut-off valve none

Dome cap of flange quality steel plate Inspection dome none

Dome casing of pressed steel, painted.

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ENGINE SPECIFICATION

ORDER 1134

Firebox of homogeneous basic carbon steel, firebox quality, from Worth Steel Co.
Door sheet and tube sheet electric welded to side &crown between staybolts.
Combustion chamber none

Thickness of crown and , sides 3/8" comb. chbr. -

tube 1/2" , throat - , door 3/8"

Crown and sides ~~and comb. chamber~~ in one piece , yes

Thermic syphons, L.F. Co.'s two unit installation in/ firebox, engs. 7641 & 7642 only. Plate 3/8" thick.
Syphon Dwg. C-2219

Firebox ring of cast steel

Width at front 5" , sides 4-1/2" , back 4-1/2" and 3-1/2" thick

Sheets to be double riveted to ring. Finish ring inside and out.

Fire hole suitable design for oil burning fire door. Oval hole, size 16"x20"

Staybolts 1" dia., spaced not over 4" centers

Body of bolt turned no . Test hole drilled in outer end 7/32" dia., 1-1/4" deep

*

Hollow staybolts applied behind fire brick lining ~~and back of pads.~~

Thermic syphon staybolts Lewis r Special hollow staybolt iron, from Penn Iron & Steel Co.

Flexible and other bolts, ~~except~~ and hollow of Lewis r Special staybolt iron , from Penn Iron & Steel Co.

Flexible bolts Alco type "Z" bolts 1" dia. with threaded sleeves, type Z-

Installation of flexibles , breaking zone in sides, and backhead, and complete in throat, , approx. in number

Radial stays 1-1/8" dia. in crown, 15/16" dia. body, 1-1/8" dia. in roof

Crown stays, see page 6

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ENGINE SPECIFICATION

ORDER 1134

Crown stays, ~~button or~~ taper head type ten rows wide

1-1/8" dia. at point, taper 1-1/2" in 12" in crown, 15/16" dia. body 1-1/8" dia. in roof

Expansion stays three front rows 18 wide Alco type ZR bolts 1-1/8" dia.

with threaded sleeves

Threading on staybolts 12 threads per inch, U.S. Standard

All taps in boiler for studs 12 threads per inch, U.S. Standard, taper 3/4" in 12".

Threading for Alco staybolt sleeves to be 12 "V" threads per inch.

Tubes of Shelby hot rolled seamless steel

Tubes from National Tube Co.

Number 234 dia., 2" thick ~~#11 B.W.G.~~ #12 BWG MIN length 20'-0" spaced 3/4"

All tubes set at back with copper ferrules swaged and beaded and electric welded.

All tubes in flue zone and 10% per cent of remainder beaded at front.

Tube and flue setting tools to be in accordance with R.R. Std.

Flues of Shelby hot rolled seamless steel

Flues from National Tube Co.

Number 45 dia., 5-3/8" thick #9 B.W.G./minimum length 20'-0"

All flues set at back with copper ferrules, swaged at back and beaded at both ends, and electric welded at back .

Fire brick tubes of none

Number - dia., - thick -

Smoke consumer tubes none

Stoker tubes none

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ENGINE SPECIFICATION

ORDER 1134

Superheater inspection holes with

Waist sheet angles or tees of cast steel.

Fusible plug none

Arch tube plugs none

Washout and syphon plugs to be located where necessary for proper cleaning of boiler. Plugs to be "Huron" sleeve type. Washout plugs to be #SR-34-R and syphon plugs in throat to be #SR-79-R . Plugs threaded 12 U.S. threads per inch, taper 1-1/4" in 12".

ORDER 1134

15 Bolts, Nuts, Etc. (for special bolts, nuts, etc., see particular group)

All bolts to have U.S. Standard threads except where finer threads are necessary.

16 Driving Boxes, Material carbon cast steel

Main Journals 11" dia. 13" long; others 10" dia. 13" long.

Bearings of National Bearing Metal Corp, Arctic bronze #36 mixture

Hub face of bronze, cast on. Shoe and wedge face of bronze, cast on.

Lubrication grease

Cellar, F.R.S. Co.'s cast steel cellar with spreader of cast steel. Cellars to have hinged end plate

End play 1/8" each side, with all parts central

17 Engine Truck Box of cast steel, Journal 6½" dia. 12" long

Bearings of National Bearing Metal Corp., Arctic bronze #36 mixture.

Hub face of brass, cast on end play each side

Cellar of cast iron for oil lubrication

Packing Lima standard

Trailing Truck box (~~rear~~) of cast steel Journal 9" dia. 14" long

Bearings of National Bearing Metal Corp, Arctic bronze #36 mixture

Hub face ~~of~~ plain end play each side

Cellar of cast iron for oil lubrication

Packing Lima standard

Trailing Truck Box (front) none

Lid -

Bearings of - Journal - dia. - long

Wedge - Dust guard -

ENGINE SPECIFICATION

ORDER 1134

18 Brackets, Stands, Etc.

19 Brake Equipment, Operating Westinghouse

Schedule ET-8

Air Pumps, two, 8½" c.c. , strainer #54, furnished with pump.

Air pump packing U.S. King type

Pump location at front of engine

Exhaust piped to exhaust passage in cylinder saddle

Air pump steam valve 1½" at turret and 1¼" in line at each pump.

Brake valve, #L-8-PA, pedestal type.

Train signal none

Main reservoir capacity (total) not less than see below cubic inches

Main reservoir, right side one *20½"x72"

Main reservoir, left side two, *20½"x72"

Reservoir hydro. test pressure 210 lbs. sq. in. 1/2 " Drain cock

Reservoir location R. & L. under running boards

Train line connections at front and rear

Piping Lima Loco. Works Standard

ENGINE SPECIFICATION

ORDER 1134

20 **Brake Equipment, Foundation** American Dwg 1790

Drivers, ~~trailer and engine truck~~ only Schedule WN-3-BC

A. B. S. & F. Co.'s. shoes on back of wheels

Brake cylinders, front *14" dia. 12" stroke; ~~back~~ ~~dia.~~ ~~stroke~~

21 **Bumper** (front) of cast steel, securely fastened to frames. O.S.F.Co 23-24-105

Knee

Step of steel plate, right and left.

Push pole pocket cast in bumper.

Deck plate of 1/4" tank steel

22 **Cab** of steel plate, #11 B.W.G. thick lined with wood

~~Roof covered with~~ cab 78" long 120" wide

Cab to be thoroughly braced and secured to boiler and running boards.
Cab floor of steel covered with wood.
Cab to have extended front or auxiliary cab, in which the main turret will be housed.
* Prime ventilators applied R. & L. in sides of cab near Enginemen's feet.

23 **Cab Details and Fittings**

Door suitable Windows sliding type, sash of hardwood and (glazed with double strength glass.

Storm Window "Prime" {Dwg SC-838-3 A = 8½" Apron of 3/16" tank steel, roughened.

Saddle with Bracket

Ventilator in roof of suitable design.

Arm rest suitable

Door fixtures L.L.W. Standard

Ventilator fixtures L.L.W. Standard

Engineer's seat Lima Loco. Wks. Standard

Fireman's seat Lima Loco. Wks. Standard

Brakeman's seat Lima Loco. Wks. Standard

Tool box with

Cab curtains to be applied similar to L.L.W. Dwg. 232-A-355.

26 Cocks and Valves

All globe and angle valves to be Crane, A.A.R. type; cocks and valves fitted to standard pipe taps unless otherwise specified.

Blower ~~(angle)~~ globe, in line and to be suitable for superheated steam.

Blower ~~auxiliary~~ (globe) 1-1/4" Okadee/ Dwg #1606, type HSD. quick opening suitable for superheated steam and provided with extension handle to cab, as on C.O. 1132.

Cylinder cock Prime #577, steam operated.

Cylinder cock operating valve 3/4" at turret and 3/4" globe within easy reach of engineer.

Syphon none

Blow off cocks, two Johnstone, size 2" type DB-220, screwed connection

Location , R. & L. in side sheets

Provide universal joints and extension handles on all turret valves.

27 Cocks, Water, Gauge and Special

Water column Edna, type "E"

Water gauge, right side Edna Reflex type "M", applied on column.

Water gauge, left side Edna Reflex, type "M"

Gauge cocks Prime Dripper of cast iron

Lowest gauge cock 4-1/2" above highest point of crown

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ENGINE SPECIFICATION

ORDER 1134

28 Cock Riggings

Cylinder steam operated

Port none

Blow off manually operated from cab

29 Crank Pins, Main of medium carbon steel normalized and tempered.

Pins, other than main of medium carbon steel normalized and tempered.

Main pin located in third driving wheel

Pins from open market

Marking as required by I.C.C.

30 Crosshead of cast steel type Alligator

shoes of cast iron, babbitted.

Wrist pin of med.carb.steel,norm.& tempered journal dia. long

Arm none

Crosshead key of carbon vanadium steel.

31 Cylinders of cast iron 23" dia. 32" stroke

Bushings of high grade cast iron

Test pressure Lima Standard

Cylinders cast half saddle and interchangeable right and left; to be accurately planed, fitted and bolted together and bolted and keyed to frames.

ENGINE SPECIFICATION

ORDER 1134

32 Cylinder Details

Head, front of cast steel back of cast steel

Cylinder head casings of 3/16" pressed steel painted

Cylinder casing of #18 B.W.G. painted steel

Steam chest bushings of high grade cast iron ~~with starting ports~~

Head, front of cast steel back of cast steel

Head casings of 3/16" pressed steel painted

Valve rod crosshead guide of cast iron

33 Cylinder Compound Attachments none

34 Cylinder, By-Pass and Relief Valve

Relief valve (in cyl. heads) none

Vacuum valve (in steam chest) none

Drifting valve none

36 Dome (see group 14)

ENGINE SPECIFICATION

ORDER 1134

37 **Drawgear, Engine,** coupler & pocket type Center above rail 33½ inches

Coupler "Simplex", A.A.R. type E, American Steel Foundries, dwg. 07364-D

Pocket of cast steel, with extended shelf. A.S.F. dwg. 05314-C

Uncoupling rigging Lima Standard, and split for independent operation from R.& L. sides.

Uncoupling shaft brackets and fillers suitable

Chafing plate none

Radial buffer Franklin Ry. Supply Co.'s type E-2. Dwg D-47455-A

Drawbar, between engine and tender Unit safety

Safety bar ~~or chain~~ See Item 8

Draw and Safety bar of wrought iron

39 **Eccentrics** of none straps of - lined with -

Location - axle, throw -

Fastening -

Eccentric crank of medium carbon steel, annealed

Crank pin of medium carbon steel, annealed.

Rod of mild steel

Rod bearings of A.A.R. bronze, made at Lima

~~Oil or~~ grease cup forged on rod

ENGINE SPECIFICATION

ORDER 1134

40 **Engine Truck,** type inside bearing, two wheeled, Gen. Steel Cast'g. Corp.
Truck frame of cast steel
Truck to be in accordance with G.S.C. dwg. 14523-N, line 2

41 **Trailing Truck,** type "Delta", two wheeled, Gen. Steel Castings Corp. Dwg 51292-A
Truck designed for booster no

44 **Exhaust Pipe** of cast iron
Nozzle of cast iron
Joint between exhaust pipe and cylinder saddle to be machined and J-M Mobiline gasket 1/32" thick tobe applied.

45 **Firedoor, Firebrick, Etc.**
Firedoor to be hand operated and of suitable design for oil fuel. Door to be as shown on L.L.W. dwg. 453-C-9

Firebrick, American Arch Co.'s "Lock" type in fire pan and fire box for oil burning. Brick arch will not be used. DWG 13188-A

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ENGINE SPECIFICATION

ORDER 1134

46 Frames of open hearth carbon cast steel, annealed. Single front rail type

Frames 6 inches wide and spaced inches center to center

Front rail, top none

Front rail, bottom cast integral with main frames and provided with lugs for holding cylinders.

Back section of Cradle type from Gen. Steel Castings Corp. Dwg 51291-A

Pedestal caps of mild steel

Pedestal cap bolts fitted with double nuts and flat split key.

Shoes and wedges of cast steel, manually operated.

Frames to be thoroughly braced together and to boiler by suitable castings, braces, expansion plates and pads.

47 Frame Details

Bumper bracket of cast steel

Crossties of cast steel

Expansion plate front of thick

Expansion plate back of thick

Fillings of cast steel

Foot plate of See Item 5

Waist sheets of tank steel

Wearing plates for spring hangers of mild steel

49 Gauges, Templates and Jigs

Principal parts of engine fitted to gauges and templates and to be interchangeable.

50 **Guides and Attachments,** type two bar, for Alligator crosshead.

Guides of medium carbon steel, normalized and tempered.

Guides securely bolted to cylinder heads and to rigid guide yoke extending across frames.

Yoke of Universal mill plate

Yoke sheet 1/2" tank steel

Yoke knee of cast steel

Yoke ends of cast steel

51 **Grate Arrangement** none

Operated by - in - sections

52 **Grate Details**

Grate bars of cast -

Dump grate of cast - at front or back of firebox

Dump operated from ground or firing deck -

Side frames of cast - in - sections

Side frames supported by -

Center frame of -

Center frame supports of -

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ENGINE SPECIFICATION

ORDER 1134

53 Handrails and Steps

Hand rails of steel pipe conveniently arranged and securely fastened.
Apply handrail across front of front bumper

Stock electrical cable and wire to be used. If necessary to purchase additional cable or wire, order from Habirshaw Division of Phelps Dodge Corp.

54 Headlight, Signal Attachments, Etc.,

Generator Pyle-National type K-240

Headlight, number one , Maker Pyle-National, No. 20-C-300 -A with #550-A focusing device.

Case of sheet metal

Reflector of copper , 18" dia.

Headlight shelf of located

Number plate numbers

Classification lamp electric , Pyle National CLBR-15

Lamp and flag/fixtures suitable located R. & L. on smoke box.

Flag fixture on front bumper

Steam gauge lamp integral with gauge Air gauge lamp integral with gauge.

* Oil burner steam line gauge lamp # LCB-40

Water gauge lamp two, electric Lubricator lamp none

Train control none

Ownership plate of brass, located R.& L., and lettered " FIRST TRUST COMPANY OF PHILADELPHIA, OWNER, AS TRUSTEE, UNDER LOUISIANA & ARKANSAS RAILWAY COMPANY EQUIPMENT TRUST OF 1936 "

Patent plates Superheater
Reid Steam Pipe Casing

55 Injector, Feed Water, Etc.,

Injector, R. H. Edna type "ENL", non-lifting, 6000 gal. capacity

Injector, L. H. Edna type "ENL, non-lifting, 6000 gal. capacity

Injectors to be furnished complete with balanced lever starting valve and cab stand.

Located R. S., below cab L. S. below cab

Steam pipe 2-1/4" O. D. copper. Suction 2-1/2" extra heavy wrought iron

Delivery 2" ex.heavy wro't iron Overflow 1-1/4" extra heavy wrought iron

Check R. S. Edna Fig. 117B No. 6, vertical type with stop valve, and bonnet inlet.

Check L. S. Edna Fig. 117B No. 6, vertical type with stop valve.

Line check none

Steam valve 2-1/4"

Strainer, R. S. 2-1/2" x 3"

Strainer, L. S. 2-1/2" x 3"

Feed water heater none

Pump -

57 Lagging and Jacket

Jacket of #18 B.W.G. painted steel Bands 5" wide

Lagging Johns Manville, sectional magnesia applied on boiler and cylinders. The lagging and jacket on sides and back head of firebox to be applied so that it can be readily removed for inspection purposes. The jacket over staybolts to be made in sections so that it can be readily removed. Minimum thickness of lagging to be 1-1/2".

All steam pipes in cab to be lagged.

Johns-Manville pipe covering to be used.

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ENGINE SPECIFICATION

ORDER 1134

1 58 **Link Motion** Walschaert, graduated to cut off equally at all points of stroke. Gear fitted with castle nuts. All pin bearings to have case hardened pins and (bushings.
2 Link of mild steel, case hardened.
3 Valve rod of none
4 Radius bar of mild steel
5 Combination lever of mild steel - see item 22
6 Union Link of mild steel
7 Eccentric crank and rod, see group 39
8 Link support of cast steel with A.A.R. bronze bushings made at Lima
9 Link support crosstie of universal mill plate
10
11
12
13
14 59 **Oil Cups and Lubrication**
15 Locomotive to be lubricated with oil and greases - open market or stock.
16 Lubrication of all bearings provided for in suitable manner, using L.L.Wks.Inc. standard grease or oil cups.
17 Lubricator pipes to be under lagging
18 Hydrostatic lubricator none, except on first two booster equipped engines, which are to have Edna 1 feed, 1 pint for booster
19
20
21 Hydro. lub. steam pipe - O. D. copper. Steam valve -
22 Force feed lubricator Edna 6 feed; feeds piped to cylinders, steam chests and to guides. Lubricator operated from top of combination lever.
23
24 Flange lubricator Detroit two feed, located below running board and piped to front drivers. DWG FD-426-D
25
26 Air pump air and steam cylinder lubricators, two, type "LB", Mechanical, Nathan Mfg. Co. DWG 3405-B and applied by W.A.B.Co
27 Guide oil cups see item 22
28 Piston rod packing oil cup see page 24, item 7
29 Valve stem packing oil cup see page 33, item 8
30

continued on page 21

ENGINE SPECIFICATION

ORDER 1134

Oil cups and lubrication continued

Valve stem guide oil cup

Oil can shelf suitable

60 **Oil Burning Attachments**

Burner type L. & A. Standard size 3", per sample furnished. Rough castings from RR Patt. 189-A and 189-B purchased from Nat. Bearing Metal Co.

Burner located front ~~or back~~ of firebox

Firing valve to be located on left side of boiler back head.

Apply a Barco flexible connection at oil burner top and bottom.

*Provide steam gauge in cab to show pressure in steam line to oil burner. See also page 18 item 21 and page 29, item 21

Steam gauge, Ashton – See Engineering file for description.

61 Painting, Lettering, Numbering and Photographs

Engine and tender to have plain paint and varnish finish, suitable for the service and to be lettered and numbered as directed by the Railway Co.

Paint and varnish to be from Sherwin-Williams Co. Paint to be "KEM" brand.

~~Locomotive is to be photographed.~~ *See item 15

R.R. Co. to furnish painting instructions and stencils.

Locomotive to be painted in accordance with Sherwin Williams specification for Finishing Locomotives with KEM Railway Enamel system.

*Cab sash and doors to be painted green on inside and black on outside.

*Lettering and numbering to be applied in aluminum leaf.

*Classification E-4-H-23x32-T-548

*Photograph one locomotive of each group; one equipped with tender booster and one without tender booster

ENGINE SPECIFICATION

ORDER 1134

62 **Pilot** of steel. Apply steps on pilot.

63 **Pipe Fittings**

Fittings differing from L. L. W. stds. may be found under the particular group.

Blower fitting at smokebox Barco

Pipe Clamps L.L.W. Std. to suit conditions

Stock copper pipe to be used. If necessary to purchase additional pipe, order from British-American Tube Division of Phelps-Dodge Copper Products Corp.

64 **Piping Arrangement** differing from L. L. W. stds. may be found under the particular group.

Piping must not interfere with easy accessibility of washout plugs.

Pipe and nipples of extra heavy wrought iron

Blower pipe 1-1/4"

Piping between engine and tender hose connections for air lines and flex. metallic connections for oil and oil heater lines.

Train line 1-1/4"

Straight air line 3/4"

Signal line none

Water scoop none

Steam heat applied by R.R.Co., see item 25.

Oil line 2" flexible Franklin, sleeve type

Oil heater line 3/4" flexible Franklin, sleeve type.

Fire extinguisher none

Sprinkler Crane #1823-P, with 6'-0" of 1/2" hose

Steam heat equipment , steam to be taken from boiler with 1½" globe valve and gauge and carried to rear of tender. The Ry. Co. to furnish and apply reducing valve and hose coupling at rear of tender, also all connections between engine and tender. Apply caps to end of pipe at rear of engine.

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ENGINE SPECIFICATION

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ORDER 1134

65 **Piston** of cast steel fitted with Hunt-Spiller gun iron bull ring.

Packing rings ~~of~~ Hunt-Spiller Duplex Sectional

Rod of med.carb. steel,norm. and tempered dia.

Rods from open market

Rod packing U. S.M.P. Co.'s King type with oil cups and swab holders. Dwg. 360246

66 **Plugs,** hand hole and washout are found in the particular groups.

68 **Reverse Lever** none, see item 22

Reverse lever end of -

Fulcrum of -

Quadrant of -

Latch of -

Power reverse gear Alco, type "G"

Cylinder packing

Cylinder bracket

Reverse gear latches on all five locomotives to be drilled for booster application.

Screw reverse gear none

69 Reverse Shaft

Shaft of mild steel

Shaft bearings of cast steel, bushed with A.A.R. bronze bearings made at Lima.

Arm of cast steel Crank of cast steel

Reach rod (lever to gear) of 1" extra heavy pipe

Reach rod (gear to rev. shaft) of mild steel with jaws forged on.

70 Rocker and Boxes none

Rocker of -

Box of -

71 Running Boards and Brackets

Running boards of steel plate, and designed to apply in a straight line from cab to smoke box.

Running board edge of tee iron

Side sheet of 1/8" steel plate

Brackets of mild steel and cast steel.

ENGINE SPECIFICATION

ORDER 1134

72 **Rods** (Main) of medium carbon steel, normalized and tempered "I" section

Bearings of National Bearing Metal Corp.

Front end bearing ~~adjustable or~~ one piece type

Back end solid end type with bronze floating bushing 3/4" thick operating in fixed bushing of Hunt-Spiller gun iron.

~~Oil or~~ grease cups forged on rod, and arranged for horizontal grease plug. Plugs and bushings, R. R. Std.

Rods to be drop tested, ~~yes or~~ no

Rods (side) of medium carbon steel, normalized and tempered rectangular section

Bearings of Nat'l-Bear. Metal Corp., bushing type, pressed into rod.

No floating bushings on side rods.

Knuckle pin of medium carbon steel, normalized and tempered.

Location of knuckle pin ahead of intermediate and back of main pins.

Rod ~~oil or~~ grease cups forged on rod, and arranged for vertical grease plugs. Plugs and bushings R.R. Std.

Rods to be drop tested, ~~yes or~~ no

ENGINE SPECIFICATION

ORDER 1134

1 73 **Sand Box,** ~~front~~ of pressed steel wide type

2 Box arranged for ~~hand and~~ air operation only

3 Top of 3/16" pressed steel sides of 1/8" plate

4 Bottom of 1/4" tank steel cover of cast iron, two per box.

5 Sander Leach type A-10 double trap

6 Sander valve Duplex #29

7 Location of box top of boiler on first course

8 To sand front of front and back of main drivers

9 Sand pipes of standard weight steel pipe.

10

11

12 Sand Box, back of none - type

13 Box arranged for hand and air operation -

14 Top of - sides of -

15 Bottom of - cover -

16 Sander and valve—see item 5 and 6

17 Location of box -

18 To sand - of - and - of - drivers

19 Sand pipes see item 9

20

21

22 Sand box for trailer wheels none

23

24

25

26

27

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ENGINE SPECIFICATION

ORDER 1134

75 Smoke Box, Arrangement, suitable design for oil fuel, and to be similar to R.R. dwg.

Deflecting plate of 3/16" tank steel

Perforated plate or netting none

Draft pipe none

Damper none

Front of pressed steel door of pressed steel

Front end hinge "Okadee"

Cinder valve none

Stack, taper ~~or straight style~~ of cast iron, short type dia. at choke

Extension of cast iron

Hood none

*Apply Garlock packing #616, size 1/8"x1½", between front and ring.

76 Springs

Driving springs of carbon steel tempered in oil and properly equalized to insure engine riding in best possible manner.

Springs from American Steel Foundries.

Engine truck springs of carbon steel, tempered in oil

Springs from American Steel Foundries.

Trailer truck springs of carbon steel, tempered in oil

Springs from American Steel Foundries.

77 Spring Rigging

Driving box saddle of cast steel

Equalizers between drivers and hangers of mild forged steel

Equalizer, front of mild forged steel

Equalizer, transverse of mild forged steel

Trailing truck equalizer mild forged steel

Equalizer fulcrum, front of cast steel

Equalizer fulcrum, back ~~of~~ integral with trailer truck frame

78 Steam Gauge, Safety Valves, Etc.

Steam gauge, number one , Maker Ashton #52 DIA/with electric light attachment.

Double/Dial 6¾" dia., graduated to 500 lbs. Case of iron

Air gauges Ashton 62-QE

*Oil burner steam line gauge, Ashton #51-S, size 6", graduated to 500 lbs.

Cab turret one of cast steel for saturated steam

Dry pipe of wrought iron

Cab turret - of - for superheated steam and arranged to supply the following accessories -

Blower only to be operated with superheated steam.

Dry pipe of - and fitted with - shut-off

ORDER 1134

Steam gauge, safety valves, etc., continued

Safety valves, maker Ashton IL type size 3"

One, type muffled to dwg. 28307 set at 240 lbs.

One, type muffled to dwg. 28307 set at 243 lbs.

One, type open to dwg. C-33404 (#28-1L) set at 246 lbs.

Location , vertical in top of boiler

Bushings of brass

Throttle safety valve, maker - type - set at - lbs.

79 Steam Pipes

Pipes of cast ~~iron~~ steel and to be outside ~~or inside~~ connected type, with "Reid" casings.

Inside dia., Joint rings of cast iron

Tee head of none

Tee head joint rings of -

Hydrostatic test of lbs. per sq. inch to be applied L.L.W. Standard

80 Stoker none

ENGINE SPECIFICATION

ORDER 1134

81 Superheater (for number of units see page 1)

Superheater Company's type "A" arrangement, to their specification

Superheater pipes of seamless steel, 1½" o. d., #9 B.W.G. thick

Header of cast iron and to have through ~~or tee head~~ bolts (see throttle)

Damper cylinder none

Pyrometer none

Header and units subject to hydrostatic test of lbs. per sq. in. L.L.W. Standard

82 Tank Valves and Cocks see Tender Specification

Tank valve (water) -

Tank valve (oil) -

83 Tank and Coal Bunker, Engine see Tender Specification

Tank on engine, style -

Capacity -

Coal bunker -

Capacity -

91 Throttle and Dry Pipe

Throttle American Multiple, integral with Superheater header

Throttle lever suitable made at L L W.

Throttle rod packing as furnished with throttle

Throttle stuffing box joint packing - asbestos rope

Throttle rod compensating lever with

Dry pipe of lap welded steel 9" o. d. 5/16" thick

Dry pipe located inside ~~or outside~~ of boiler

Dry pipe sleeve, front of cast steel

Dry pipe sleeve ~~or elbow~~, back of cast steel

Rivets of none; sleeves welded to drypipe

92 Tools

Tools and accessories to include all necessary wrenches and spanners, one hard and one soft hammer, monkey wrench, cold chisel, three oil cans, two jack screws and two cast steel rerailers.

ENGINE SPECIFICATION

ORDER 1134

1 94 **Valves, Distribution,** piston type, 12" dia. inside admission

2 Packing rings Hunt-Spiller Duplex Sectional

3 Bull rings Hunt-Spiller gun iron

4 Valve body of steel tube, followers of cast steel

5 Valve travel 7" Maximum cut-off 85.3% Steam lap 1-1/4"

6 Exhaust lap or clearance line and line Lead 3/16"

7 Valve stem of med. carb. steel annealed, 2"dia.

8 Steam packing U.S.M.P. Co.'s King type with oil cups and swab holders. Dwg. 360247

9 Valve rod crosshead of mild steel

10

11

12

13

14 95 **Driving Wheels,** main of alloy cast steel others of carbon cast steel

15 Dia. of wheel 63"; dia. of center 56"

16 Hub liner "Christman" type, of cast iron.* ~~and to be stamped "Patented" at a place~~

17 ~~where there is no wear and which does not interfere with the use of the plate.~~ See also item 26.

18 Tires of open hearth carbon steel; Edgewater Steel Co.

19 Tire section Master Mechanics standard tread and flange.

20 All pairs flanged 5½" wide 3½" thick

21 - pair plain - wide - thick

22 Between tires, front 53-1/8", 2nd 53-1/4", 3rd 53-1/4", 4th 53-1/8", 5th -

23 Retaining rings none. Tires held by shrinkage only; no shoulder required.

24 Counterbalance, wheels to be carefully proportioned and accurately counterbalanced in accordance with Lima Loco. Wks. standard practice.

25

26 Hub liner continued: - After the hub liners or plates have been applied to wheels, all pockets in hub plates and the cavity in wheel to be filled with

27 grease and the plug screwed down before engine is wheeled. Grease plugs in

28 wheels to be same size as used in rods.

29

30

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95 **Wheels**, engine truck, nominal dia. 33", of rolled steel, quenched and tempered, from Standard Steel Works.

Centers of none — CARD OD-644, AAR Contour, Rev 1932 - dia.

Hub liner of -

Tires -

Tire - wide - thick. Section Master Mechanics Standard

Tire held by - 53-5/16" Between tires

Wheels, trailing truck, ~~rear~~, nominal dia. 43"

Centers of carbon cast steel, spoked type 36" dia.

Hub liner of bronze

Tires of open hearth carbon steel; Edgewater Steel Co.

Tire 5-1/2" wide 3-1/2" thick. Section Master Mechanics Standard

Tire held by shrinkage only; no shoulder required. 53-5/16" Between tires

Wheels, trailing truck, front, nominal dia. none

Centers of - - dia.

Tires -

Tire - wide - thick. Section-

Tire held by - - Between tires

ENGINE SPECIFICATION

ORDER 1134

96 Whistle and Rigging

Whistle Nathan chime, *type 963A1070 shown on their drawing 1658

Rigging hand operated

99 Miscellaneous

Engine to be weighed yes

Speed recorder none

Booster none, see page 12-T, item 9 of Tender Specification.
Engs. 7641-7642 arranged for Franklin Tender Booster, and the three remaining engines to be the same as the first two, as nearly as possible, for future application of boosters.

Safety appliances to meet I.C.C. requirements, for both freight and switching service, except that pilot and bumper steps will be applied similar to L.L.W. dwg. 623-A-1

*Reports:- Send two (2) copies each of form #3 and form #4 to the R.R. Co., and place one (1) copy of form #3 in cab.

LIMA LOCOMOTIVE WORKS, INCORPORATED

Lima, Ohio, April 28, 1936 19

TENDER SPECIFICATION

Order No. 1134 **For** LOUISIANA & ARKANSAS RAILWAY COMPANY

Based on Spec. A-2720 **General Design Shown by**

No. of Tenders 5 **Type** eight wheel **Service** Freight & Switching

Shop Numbers 7641-7645 **Road Numbers** 561-565

Made by A.M.S. **Checked by**

Tender Tank, type rectangular, with level top

Water capacity 9500 U. S. gals. Fuel capacity 4000 U.S. gallons

Water Scoop, type none

Stoker, type none

Weight, loaded 210000 lbs., with booster, Tenders #7641-7642
194000 lbs., without booster, Tenders #7643-7645

Specified

→ Actual * 207400 lbs. with booster tenders 7641-7642
188600 lbs. without booster tenders 7642-7645

Limitation

Wheel base, tender 23'-10"

Wheel base, truck 5'-10", truck centers, 18'-0"

Gauge of track 4' - 8-1/2"

Limitations, height filling hole width

Clearance Diagram

TENDER SPECIFICATION

ORDER 1134

Material Specifications and Inspection

See page 2 of Engine Specification.

TENDER SPECIFICATION

ORDER 1134

~~annealed~~
unannealed

11 **Axles** of medium carbon steel

Made by open market

Journals 6" dia. 11" long

Marking as required by I.C.C.

15 **Bolts, Nuts, Etc.** For special bolts etc., see the particular group

17 **Boxes** of malleable iron Maker T. H. Symington Co. Dwg P-332-A

Lid furnished with box Dwg P-314-A

Bearing National Bearing Metals Corp. A.A.R. Standard

Wedge drop forged

Dust Guard L.L.W. Standard, fibre.

Packing L.L.W. Standard

53 **Handrails and Steps**

Tank handle, front with rear with, also hand rail across back and short grab irons on face of rear end sill.

Tank ladder, rear with inside none

Tender step, front R. & L. of cast iron

Tender step, rear R. & L. stirrup type also step boards of wood, with risers.

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TENDER SPECIFICATION

ORDER 1134

54 Headlight, Signal Attachments, Etc.

Headlight, rear, see group 54 in engine specification

Shelf of none located -

Back-up lamp Pyle-National #TSLC-228-S

Marker lamps electric , Pyle National MLBR-15

Marker lamp fixture suitable

Flag fixture suitable

Ownership plate of brass, locate R.& L. on frame, and lettered " FIRST TRUST COMPANY OF PHILADELPHIA, OWNER, AS TRUSTEE, UNDER LOUISIANA & ARKANSAS RAILWAY COMPANY EQUIPMENT EQUIPMENT TRUST OF 1936 "

Train control none

62 Pilot none

63 Pipe Fittings, Etc.

Fittings differing from L. L. W. Std. may be found under the particular group.

Pipe Clamps L.L.W. standard

Angle cock holder L.L.W. standard

64 Piping, see also under the particular groups

Pipe of extra heavy wrought iron

Journal cooling none

Sprinkler none

Steam heat with. Pipe to rear of tender only. The Ry. Co. to furnish and apply reducing valve and hose coupling at rear of tender, and connections between engine and tender. The steam heat pipe to be capped at both ends.

At rear of tank, provide a 2-1/2" pipe with gate valve for connecting to auxiliary tank as instructed by R. R. Co.

71 Running Boards none.

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TENDER SPECIFICATION

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73 **Sandbox** (for flue cleaning) to be provided

76 **Springs** of carbon steel, tempered in oil.

Truck elliptic Maker American Steel Foundries

Buffer none

80 **Stoker** none

82 **Tank Valves and Cocks**

Tank valve Lima Loco. Wks. Standard

Strainer Lima Loco. Wks. Standard

Tank cock with

Hose, feed water 3"

Cooler cocks, (journal cooling) none

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TENDER SPECIFICATION

10

PAGE 6T

ORDER 1134

84 Tender Brakes

Schedule #8 ET Westinghouse

Train-Signal none

Vent valve NO.4-B

Brake cylinder *16" dia. 12" stroke. Type *"Q" L"**

Packing

Slack adjuster None

Brake arrangement on frame L.L.W. Standard

Hand brake shaft none

Brake arrangement on truck L.L.W. Standard

Brake beams, type Hercules #108½ , except on booster trucks

Maker American Steel Foundries DWG 12625=B, head style 2
(on spare truck, beam to DWG 12625-C)

Third point support none

Brake shoes A.B.S. & F. Co.

Brake heads adjustable type, furnished with beams.

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TENDER SPECIFICATION

PAGE 7T

ORDER 1134

1 85 **Tender Frame** built up type, substantially constructed and thoroughly braced to preserve original form.
2
3
4 Inside channels 13" deep 50 lbs. per foot. ~~Section~~ heavily reinforced.
5 Outside channels 10" deep 30 lbs. per foot. Section
6
7 Flooring of yellow pine
8
9
10 Bolsters of pressed steel and cast steel
11
12 Bumper front of cast steel G.S.C. Dwg 5-1301-C
13 Bumper back of cast steel " " 5-1302-B
14
15 Center plate of cast steel
16
17
18 Push pole none, * ~~but provide carrier~~
19
20 Push pole pockets cast in back bumper
21
22 Side bearings plain
23 Side bearings, front, spaced 50" centers. Clearance
24 Side bearings, back, spaced 50" centers. Clearance
25
26 Wrecking frogs, see group 92 of engine specification
27 Wrecking frog supports to be provided.
28
29
30

10

TENDER SPECIFICATION

ORDER 1134

1 86 **Tender Draw Gear,** rear Cardwell-Westinghouse type NY-11-E

2 Farlow attachment none

3 Coupler yoke of cast steel

4

5 Coupler "Simplex", A.A.R. type E Dwg 07261-D with $6\frac{1}{4}$"x 8" shank. American Steel Foundries

6 Coupler center above rail ~~33-1/2"~~ *33"

7

8

9 Drawbar between engine and tender unit safety

10 Safety bar ~~or chain~~ see Item 9

11

12 Buffer, front Franklin Ry. Supply Co.'s type E-2.

13 Buffer, back none

14

15 Chafing plate, front see Item 12

16 Chafing plate pocket -

17

18 Draw casting, front of cast steel

19 Draw casting, rear see Item 1.

20

21 Safety chain, rear none

22

23 Uncoupling rigging Lima Loco. Wks. Standard , and split for independent operation from R & L. sides.

24 Uncoupling shaft brackets and fillers suitable

25

26

27

28

29

30

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TENDER SPECIFICATION

ORDER 1134

87 **Tender Deck**

Tool Box of steel plate

Water cooler none

88 **Tank** (water) rectangular level top type and without slope sheet in space occupied by oil tank. All tank plate from Youngstown Sheet & Tube Co.
Water and fuel capacity, see page 1 (except plates which exceed their width limitations.

Tank constructed with angle iron frame, substantially braced

Thickness of plates, top 5/16" , bottom 3/8" , outside 1/4", , ~~coal~~ oil tank space 5/16"

slope sheet none , shovel plate none , swash plates 1/4"

Drain pipes with

Filling hole 18" x 42"

Longitudinal spacing between water tank and oil tank filling holes to be approximately 10'-6".

Coal pusher none

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TENDER SPECIFICATION

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ORDER 1134

88 **Coal Gate** none

Fuel Rack none

Vestibule none

Tank (oil)

Capacity, see page 1

Thickness of plates 3/8" and rivets to be 5/8" dia.

The oil tank to be so designed as to occupy fuel space in tender, and to be securely anchored in position. Provide oak chafing blocks between oil and water tanks. Tank provided with measuring rod and oil control.

Oil heater of coil type placed in fuel tank, also fitted with a steam pipe as an emergency heater.
The coils of the oil heater are to be laid flat and to be approx. 4" above bottom of tank.

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TENDER SPECIFICATION

PAGE 11T

ORDER 1134

89 **Tender Truck,** type "Andrews" cast steel side frame OSF-Dwg 203-LB-102

Bolster of cast steel OSF. Co. Dwg 23-LC-19

Center plate of cast steel

Side bearings of cast steel

Side bearing spacing and clearance, see group 85

Truck safety chains *None ~~with, applied on all four corners of both trucks.~~

90 **Water Scoop** none

95 **Wheels** of rolled steel, quenched and tempered nominal dia. 33"

Maker Standard Steel Works Dwg-DD-645-

Booster trucks to have steel tired wheels Centers 30", tires 3" thick = 36"00

Marking as required by I.C.C.

TENDER SPECIFICATION

ORDER 1134

99 Miscellaneous

Tender to be weighed, see group 99 in engine specification

Safety appliances to meet all I.C.C. requirements, for both freight and switching service.

Tender booster to be applied on locos. shop #7641 and 7642 only.
Booster, Franklin Ry. Supply Co. Type C-2-L.
The three remaining tenders to be the same as the first two, as nearly as possible, for future application of boosters.

113
93